

# Development of an Exploration-Class Cascade Distillation System: Flight Like Prototype Design Status

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The ability to recover and purify water through physiochemical processes is crucial for realizing long-term human space missions, including both planetary habitation and space travel. Because of their robust nature, distillation systems have been actively pursued as one of the technologies for water recovery. One such technology is the Cascade Distillation System (CDS) a multi-stage vacuum rotary distiller system designed to recover water in a microgravity environment. The CDS provides a similar function to the state of the art (SOA) vapor compressor distiller (VCD) currently employed on the International Space Station, but its control scheme and ancillary components are judged to be more straightforward and simpler to implement into a more reliable and efficient system. Through the Advanced Exploration Systems (AES) Life Support Systems (LSS) Project, the NASA Johnson Space Center (JSC) in collaboration with Honeywell International is developing a second generation flight forward prototype (CDS 2.0). A preliminary design for the CDS 2.0 was presented to the project in September 2014. Following this review, detailed design of the system continued. The existing ground test prototype was used as a platform to demonstrate key 2.0 design and operational concepts to support this effort and mitigate design risk. A volumetric prototype was also developed to evaluate the packaging design for operability and maintainability. The updated system design was reviewed by the AES LSS Project and other key stakeholders in September 2015. This paper details the status of the CDS 2.0 design.

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